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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/664,681	09/19/2003	Demetri Psaltis	331326-283	4072
73230 7590 03/04/2009 DLA PIPER US LLP 1999 AVENUE OF THE STARS SUITE 400 LOS ANGELES, CA 90067-6023				
EXAMINER LAMB, CHRISTOPHER RAY				
ART UNIT		PAPER NUMBER		
2627				
MAIL DATE		DELIVERY MODE		
03/04/2009		PAPER		

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.

10/664,681

Applicant(s)

PSALTIS ET AL.

Examiner

CHRISTOPHER R. LAMB

Art Unit

2627

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1, 3-6, 8 and 10 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1, 3-6, 8 and 10 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/S508)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 112

1. The following is a quotation of the first paragraph of 35 U.S.C. 112:

The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

2. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

At the time the invention was filed, the specification disclosed several alternate methods of placing the nanometer sized carriers. One method was laser-induced technology; another method inkjet technology. There was no disclosure that these methods could be combined.

However, claim 8, which recites, "wherein said placing of said carriers is performed using laser-induced technology," is dependent on the amended claim 1, which now recites "placing a plurality...of carriers...using inkjet technology."

Therefore the claim appears to contain subject matter wherein the carriers are placed using both laser-induced technology and inkjet technology. This was not described in the specification at the time the application was filed.

3. Claims 1, 3-6, 8 and 10 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter

which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 1:

The subject matter that is not enabled is "placing a plurality of nanometer sized carriers of different colors using inkjet technology at each of a plurality of data pit locations on a rotating data storage medium disk to represent data by the presence and absence of said colors."

One of ordinary skill in the art would be unable to perform this method step without undue experimentation.

The specification discloses that the claimed "different carriers of different colors" are quantum dots, which are "nano-scale crystalline structures" (specification: page 10, line 14). These quantum dots are "approximately 10 nm" in size (specification: page 11, line 7).

The specification proposes three methods of placing these different carriers of different colors: first, using inkjet based technology; second, using holey fibers; and third, using laser induced technology. Since the claim clearly specifies inkjet technology only that embodiment will be addressed here.

The entire disclosure of using inkjet technology consists of paragraphs 30-32 of the specification (using the paragraph numbering in the pre-pub 2004/0114491). Paragraph 30 describes inkjet technology in general; paragraphs 31 and 32 are a

theoretical calculation of how much information could be stored per square inch with a spot size of 0.32 μm .

These three paragraphs are not sufficient to enable one of ordinary skill to make and/or use the invention without undue experimentation. Paragraph 30 appears to imply that conventional inkjet technology could be used to place the quantum dots. However, there are substantial differences between a conventional inkjet printer and applicant's invention. The quantum dots are on the order of a nanometer in size, and in order to represent data, need to be precisely placed in particular groups in specific data pits. These data pits are, the specification discloses, approximately 0.32 μm in size: a size that is significantly smaller than standard inkjet print accuracy. The specification does not discuss any means for overcoming these differences.

To decide whether the disclosure does not satisfy the enablement requirement, and whether any necessary experimentation is undue, the Examiner has weighed in particular the following factors:

(A) The nature of the invention.

The basic concept has already been discussed, but of particular note is that the specification discloses that "the present invention can increase the storage capability [of a disk drive] by several orders of magnitude. The present invention provides this advantage by multiplying the amount of data that can be stored at each pit" (specification: page 8, lines 7-9). The disclosure later suggests "a storage density of say 1 terabit/square inch," (specification: page 12, lines 7-8), which is enormously larger than current storage capacities.

(B) The state of the prior art.

The Examiner has found no evidence that placing quantum dots at this level of storage density is so well understood or well known that one of ordinary skill would be able to make the invention without more detailed direction from the inventor. The Applicant cites in the specification several papers, apparently to demonstrate the level of knowledge in the art, but these papers do not teach or suggest any part of the claimed element in question. They are not directed to optical recording at all.

(C) The amount of direction provided by the inventor.

The inventor provides no direction whatsoever. The applicant's disclosure of the inkjet based technology consists entirely of a theoretical calculation of the achievable storage density. The disclosure implies that a standard inkjet nozzle would be sufficient to place these quantum dots (each with an approximate size of 10nm) with such specificity as to achieve a storage density near to or exceeding 1 Tb/in², requiring printing on the scale of a commercial disk spot size of 0.32 μ m. Considering that this resolution is several orders of magnitude higher than typical inkjet printing, it would appear that more direction would be required to enable this method.

(D) The existence of working examples.

There are none. The only example is, as discussed above, essentially a theoretical calculation of the achievable storage density, not a practical means of implementing the system.

Regarding claims 2-6, 8, and 10:

They are dependent on claim 1. There is also a separate enablement problem with claim 8 which is discussed below.

4. Claim 8 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Claim 8, which recites, "wherein said placing of said carriers is performed using laser-induced technology," is dependent on the amended claim 1, which now recites "placing a plurality...of carriers...using inkjet technology." Therefore the claim appears to contain subject matter wherein the carriers are placed using both laser-induced technology and inkjet technology.

This is not described in the specification. In the specification, the laser-induced technology is performed on "metallic nano-particles embedded within a host material," and is not combined in any way with inkjet technology, which is disclosed as an alternative method of placing the carriers. Given that there is no discussion of the combination, no direction provided by the inventor in how to combine them, and no working examples of the combination, one of ordinary skill would not be able to make and/or use the claimed subject matter without undue experimentation.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claim 8 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

This claim recites wherein "said placing of said carriers is performed using laser-induced technology." However, it is dependent on claim 1, which recites "placing..carriers...using inkjet technology." Since these two methods appear to be mutually exclusive, the claim is unclear: are the carriers placed using inkjet technology, or are they placed using laser-induced technology? The claim contradicts itself on this point, and therefore fails to particularly point out and distinctly claim the subject matter of how the placing of the carriers is performed.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. Claims 1, 3-6, and 8 are rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew (US 6,692,031) in view of Nakajima et al. (US 2002/0001274).

Regarding claim 1:

McGrew discloses:

A method of storing data comprising:

placing a plurality of nanometer sized carriers of different colors using inkjet technology at each of a plurality of data locations on a medium to represent data by the

presence and absence of said colors (column 5, lines 5-25: "20 or more distinct sizes" corresponds to 20 or more colors; quantum dots are nanometer sized carriers; McGrew discloses they are placed by inkjet technology in column 6, lines 10-20);

exciting said colors within said carriers by making them fluoresce (a reader reads the fluorescence signature: column 4, lines 20-35);

measuring said fluorescence of said carriers to identify presence and absence of said colors (again, column 4, lines 20-35).

McGrew does not disclose:

(A) wherein the data locations are data pit locations; or

(B) wherein said medium is a "rotating data storage medium disk."

However, McGrew does disclose that the carriers are used to provide a distinct signature or marking (column 2, lines 20-40).

Nakajima discloses:

wherein a distinct identifier is recorded in data pit locations (paragraphs 50-52) on a rotating data storage medium disc (paragraph 7).

It would have been obvious to one of ordinary skill in the art to include in McGrew wherein the data locations are data pit locations and the medium, is a rotating data storage medium disk, as taught by Nakajima.

The rationale is as follows:

Nakajima discloses that there is a need to record unique information on a disc (e.g., paragraphs 7-8).

McGrew discloses that quantum dots are a superior means of recording identification marks (column 2, lines 20-40).

Therefore it's obvious to use the quantum dots as identification marks on an optical disc, in order to gain the advantages disclosed by McGrew.

McGrew further discloses that quantum dots can be combined with other optically detectable features for improved security (column 6, lines 40-45).

Therefore it's obvious to combine the optically detectable feature of the data pits disclosed by Nakajima with the quantum dots of McGrew, in order to gain improved security.

Regarding claim 3:

In McGrew in view of Nakajima, said carriers are nanometer size fluorescent particles (quantum dots; McGrew: column 5, lines 5-25).

Regarding claim 4:

In McGrew in view of Nakajima, said particles comprise quantum dots (McGrew: column 5, lines 5-25).

Regarding claim 5:

McGrew in view of Nakajima discloses a method of storing data as discussed above.

McGrew in view of Nakajima does not disclose "wherein said quantum dots are made up of a red, blue, and green color."

However, McGrew does disclose wherein there are 20 or more distinct sizes of particles (column 5, lines 5-35). Since each size is a different color, there are thus 20 or more distinct colors of quantum dots.

Therefore it would be obvious to one of ordinary skill in the art at the time of the invention to include wherein some of the quantum dots are red, blue, and green, because with 20 or more colors, it would be obvious to have red, blue, and green among them, as these are standard colors. Furthermore, the Applicant does not disclose that the use of red, blue, or green solves any stated problem or is for any particular purpose (they are selected only "for purposes of example" on page 8 of the specification), and it appears the invention would perform equally well with any colors.

Regarding claim 6:

In McGrew in view of Nakajima, said quantum dots are made up of a plurality of shades of a color (In column 5, lines 5-35, McGrew discloses there may be 20 or more distinct sizes. Since each distinct size corresponds to a different color, if there are 20 of them there must be a plurality of shades of at least one standard color, since there are only eight of those: i.e., red, yellow, orange, green, blue, indigo, or violet.)

Regarding claim 8:

McGrew in view of Nakajima, discloses wherein said placing of said carriers is performed using laser-induced technology (column 5, lines 5-35: a laser is used to fix the dots).

9. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over McGrew in view of Nakajima as applied to claim 1 above, and further in view of Metz (US 5,166,813).

Regarding claim 10:

McGrew in view of Nakajima discloses a method for storing data as discussed above in the rejection of claim 1.

McGrew in view of Nakajima does not disclose "wherein a HSMF is used for dispersing collimated fluorescent light on a spectrally sensitive component."

Note that Applicant defines a HSMF as a "holographic multi-spectral filter" in the specification (page 17).

Metz discloses that when detecting fluorescence, a holographic multi-spectral filter is used for dispersing collimated fluorescent light on a spectrally sensitive component (the abstract discloses the use of a holographic filter; Fig. 1 depicts the light impacting the spectrally sensitive component; column 12, lines 40-50 discloses that the hologram can be multi-spectral: that is, it transmits more than one wavelength). Metz discloses that a holographic filter is more efficient (column 13, lines 1-15).

It would have been obvious to one of ordinary skill at the time of the invention to include in McGrew in view of Nakajima a holographic multi-spectral filter as taught by Metz. The motivation would have been to be more efficient.

Response to Arguments

10. Applicant's arguments with respect to the enablement rejection of claims 1, 3-6, 8, and 10 have been fully considered and are not persuasive.

Applicant actually makes several arguments with respect to this rejection. The second two of these arguments are completely irrelevant for reasons discussed below; the first argument will be addressed.

Applicant's first argument is that the pits could be of any size, and that the 0.32 μm pit size is just an example and not limiting. To support that the pits could be of any size, applicant quotes paragraph 21, which states "the present invention provides a method for increasing the storage capability of a disk drive regardless of the physical dimensions of the pits."

Respectfully, this argument is a little misleading. The 0.32 μm pit size is not just one of many examples: it is the only example. It is the only pit size disclosed in the discussion of inkjet technology. The entire disclosure of inkjet technology is only three paragraphs long, and two of the three paragraphs are devoted to this pit size. The other paragraph is just a discussion of inkjet technology in general. At no point is any other size pit disclosed.

The section of paragraph 21 quoted in applicant's arguments is not related to using inkjet technology. It is part of a discussion about how current technology has reached its limit. Here, the specification is saying that pits cannot be made smaller, and the invention has the advantage of increasing data storage without decreasing the pit size. In context, it's not saying that the pits could be any size; it's saying that unlike other technologies, with this one pits do not need to get any smaller than they already are in order to increase the amount of data stored. There is no disclosure in the

specification of using inkjet technology in combination with pits larger than those used in a standard optical disc.

Applicant's second argument involves U.S. Patent 7,367,505. This patent is irrelevant, as this document was not published until well after the filing date of the instant application. An application must be enabled as of its filing date.

Applicant's argument about the laser induced technology is irrelevant, since applicant has amended the claim to specify inkjet technology.

11. Applicant's arguments with respect to the 103 rejections of claim 1, 3-6, 8, and 10 have been considered but are moot in view of the new ground(s) of rejection.

Applicant makes one argument directed to the base reference, McGrew, which may still apply to the new rejection. Applicant argues that McGrew requires different sized particles to provide different colors.

McGrew does disclose using particles of slightly different sizes, but all of the particles are nonetheless "nanometer sized." See, for example, McGrew column 1, lines 50-60, where the quantum dots are disclosed as being "nanometer-sized crystals." It's clear from the description here (and, e.g., column 2, lines 5-20) that the term "nanometer-sized" means on the order of a nanometer, not exactly one nanometer.

Furthermore, McGrew discloses using exactly the same quantum dots as applicant discloses in their specification. If applicant has a plurality of colors, as claimed, applicant must be using particles of slightly different sizes as well: it is the different sizes that make quantum dots fluoresce at different colors.

Applicant's other arguments are moot in view of the new ground of rejection.

Conclusion

12. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to **CHRISTOPHER R. LAMB** whose telephone number is (571)272-5264. The examiner can normally be reached on 9:00 AM to 5:30 PM Monday to Friday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Feild can be reached on (571) 272-4090. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Joseph H. Feild/
Supervisory Patent Examiner, Art
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CRL 2/26/09